

REMARKS

The Official Action of October 19, 2005 does not have a shortened statutory period for response and therefore, the deadline for response without any extension is April 19, 2006. In this regard, attention is directed to the statement in the Office Action summary that if no period for reply is specified above, the maximum statutory period will apply and will expire six months from the mailing date of this communication. Under these circumstances, no extension of time is required.

Favorable reconsideration is respectfully requested.

The claims are 14 to 24.

The above amendment presents a new set of claims.

The following shows correspondence between the new claims and the claims which they replace:

<u>New</u>	<u>Original</u>
14	1
15	3
16	4
17	5
18	6
19	7
20	9
21	11
22	New
23	New
24	New

The term "biosensor chip" in the claims is based on the present specification, page 9, lines 22 to 24, and on the phrase "Immobilization of PEG onto JI sensor chips" below the heading of "Examples 1-8" at page 19 of the same, and the like.

The following passage:

one group of said polymers have an integer, n, as an average value, of 50-10,000 and the other group of said polymers have an integer less than that by at least 10

which occurs in the claims is based on the present specification, page 16, lines 9 to 13 and page 8, lines 9 to 13.

The significance of the above amendments will be discussed in further detail below.

The above amendment to the specification corrects minor errors.

Concerning the amendment of “free metal” at page 2, line 3 to --free-electron metal-- this correction is evident since said metal is exemplified by gold and silver in the specification.

With regard to the comment in Official Action paragraph 1 that documents (references) cited in the IDS have not been considered, such references have already been supplied with the Supplemental Information Disclosure Statement filed December 23, 2005. Accordingly, a new PTO-1449 listing these documents which have not been initialed is submitted herewith.

With regard to the rejection of claim 5 as indefinite in Official Action paragraph 4, claim 5 has been canceled and replaced with claim 17 which clarifies the rejected terminology.

Claims 1 to 8 have been rejected under 35 U.S.C. 102(b) as being unpatentable by Lee et al. (U.S. 6,235,340 B1) in Official Action paragraph 6.

Lee et al. column 18, lines 37–51 discloses the following:

Surface-bound poly(ethylene glycol) (PEG) is a common strategy for retarding the non-specific adsorption of proteins and other biological species... the incorporated PEGs of proteins can have limited effect on non-specific adsorption depending on the surface density of the PEG chain. The direct attachment of PEG chains to the surface provides a superior method for manipulating surface properties; however, multiple processing steps are often required for coupling the PEG molecules to the substrate.

Thus, Lee et al. disclose an invention to solve the problem of surface modification in using poly(ethylene glycol).

In Lee et al., column 19, lines 38–42, for instance, it is stated as follows:

In this paper, we demonstrate the effectiveness of methyl-capped di- and triethylene glycol-terminated silane reagents, $\text{CH}_3\text{O}(\text{CH}_2\text{CH}_2\text{O})_{2,3}(\text{CH}_2)_{11}\text{SiCl}_3$, for producing robust molecular films that inhibit the non-specific adsorption of proteins.

As quoted above, Lee et al. disclose a surface to which oligo(ethylene glycol) derivatives are attached.

The present invention, as defined in Claim 14, provides a biosensor (chip) to which there are linked two groups of poly(ethylene glycol) derivatives (hereinafter referred to as “two groups of polymer”) whose ethylene glycol units (“n”) are 10–10,000, wherein:

one group of said polymers have an integer, n, as an average value, of 50–10,000 and the other group of said polymers have an integer less than that by at least 10.

Thus, the use of two groups of polymer of the present invention which are different in the number of ethylene glycol units by at least 10 would have been neither anticipated by, nor obvious from, the use of oligo(ethylene glycol) derivatives, i.e., only a few ethylene glycol units.

In Official Action paragraphs 6, 7, 8, 9, 10 and 11, it is stated repeatedly:

Polymer chain number on surface (claims 1–2, 5) and the number of ethylene oxide ($\text{CH}_2\text{CH}_2\text{O}$) repeat (i.e. value of “n”) in the polymer are routine modifications in the art for...

Even if the above-quoted statement were correct, it would have been natural for art-skilled persons to hesitate to use PEG or refrain from routinely using PEG derivatives instead of oligo(ethylene glycol) derivatives, if the above-quoted passages of Lee et al. which refer to “Surface-bound poly(ethylene glycol) (PEG)” are to be drawn on.

Nevertheless, the present invention employs the above-mentioned two groups of polymer, and thereby successfully provides, by a very simple method (as defined in Claims 20 to 22), a modified surface wherein non-specific adsorption is remarkably reduced.

Compare, for instance, Examples 1, 2 and 7, with Examples 3, 4 and 5, in Fig. 1 of the present application. The action and effects produced by the use of the

aforementioned two groups of polymer as demonstrated Fig. 1 are therefore unobvious from Lee et al.

Claims 1, 2, 5, 7 and 8 have been rejected under 35 U.S.C. 102(b) as being unpatentable by Ostuni et al. (Colloids and surfaces B: Biointerfaces 1999).

This rejection is respectfully traversed.

Ostuni et al. (E. Ostuni, L. Yan, G.M. Whitesides) as cited in paragraph 7. disclose alkanethiols terminated with oligo(ethylene glycol) which assemble on gold surface and form oriented, densely packed molecular coatings ("self-assembled monolayers = SAMs) (see Ostuni et al., Abstract), as set forth in Lee et al., column 19, lines 12–26.

On the basis of the above-mentioned disclosure, Lee et al. state in column 19, lines 21–28, as follows:

Their observation that only a few ethylene glycol units were required in these oriented assemblies to retard protein adsorption..." (emphasis added)

Thus, Ostuni et al. would not have motivated any art-skilled person to use even poly(ethylene glycol) derivatives whose ethylene glycol units are 50–10,000 as in the present invention.

Incidentally, Kataoka et al. (U.S. 6,927,033), cited in paragraph 11 of the Official Action, was granted over Ostuni et al.

The present invention uses not only the polymer of US '033, but specific two groups selected from the polymer. Owing to the use of said specific two groups of polymer, the present invention exhibits excellent action and effects as would be seen from a comparison between Examples 1, 2 and 7, and Examples 3, 4 and 5, in Fig. 1 of the present application.

Claims 1 to 3, 5, 7 to 10 and 12 have been rejected under 35 U.S.C. 102(b) as being anticipated by Gitler et al. (5,204,239).

This rejection is respectfully traversed.

Gitler et al. discloses in claim 4 in columns 13–14, a biosensor which comprises bridging anchoring molecule, as follows:

the formula

PE-NH-(CH₂-CH₂-O)_n-CH₂-CH₂-SH

wherein ... and n is an integer of from about 7 to about 24

The use of the aforementioned two groups of polymer of the present invention is, however, neither anticipated by, nor obvious from, Gitler et al.

Claims 1 to 3, 5, 7 to 10 and 12 have been rejected under 35 U.S.C. 103(a) as being anticipated by Otsuka et al. (J. Am. Chem. Soc. 2001).

This rejection is respectfully traversed.

Otsuka et al. reference as cited in paragraph 9 has authors almost in common with the present invention. This reference discloses gold nanoparticles coated with acetal-PEG-SH (Mn = 3090) (which corresponds to about 70 ethylene glycol units) (see page 8228, left column, Scheme 2). As would clearly be seen from the illustration of surface of nanoparticles given in said Scheme 2, the use of the aforementioned two groups of polymer of the present invention is neither anticipated by, nor obvious from, Otsuka et al.

Attention is also directed to the fact that the effects of the present invention would have been unforeseeable from Otsuka et al., as would be seen from a comparison between Examples 1, 2 (which resemble the polymers of Otsuka et al.) and 7, and Examples 3, 4 and 5, in Fig. 1 of the present application.

Claims 1 to 3, 5, 7 to 10 and 12 stand rejected under 35 U.S.C. 102(e) as being anticipated by Kataoka et al. (U.S. 2004/0038506 A1).

This rejection is also respectfully traversed.

Kataoka (U.S. 2004/0038506) is based on international application PCT/JP2001/001039 and was published in Japanese. See the attached sheet from WIPO in this regard. Therefore, Kataoka U.S. 2004/0038506 has an effective date as of its publication date of February 26, 2004. It is antedated by Applicants' international filing date or Applicants' Japanese priority date. A verified English translation of Applicants' Japanese priority application is enclosed.

Even if this reference were not antedated, it should be noted that this reference neither mentions nor suggests use of two groups of polymers of the present claims.

Claims 1 to 3, 5, 7 to 10 and 12 have been rejected under 35 U.S.C. 102(e) as being anticipated by Kataoka et al. (U.S. 6,927,033 B2).

This rejection is respectfully traversed.

Kataoka et al. (U.S. Patent No. 6,927,033 B2; referred to as US '033) disclose a biosensor chip onto the surface of which a polymer similar to that of the present invention is coupled. This US '033, however, neither mentions nor suggests the use of two groups of polymers of the present invention.

Furthermore, the effects of the present invention are unobvious from US '033, as would be seen from a comparison between Examples 1, 2 (which correspond to the polymers of US '033) and 7, and Examples 3, 4 and 5, in Fig. 1 of the present application.

Therefore, it is considered that the present invention is neither anticipated by, nor obvious from, US '033.

Claims 9 to 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (U.S. 6,235,340 B1).

This rejection is also respectfully traversed.

Please see the above remarks concerning Lee et al. and its comparison with the present application.

Concerning the double patenting rejection of claims 1 to 13 over claims 1 to 11 of co-pending application 10/509,576 in Official Action paragraph 15 and the double patenting rejection of claims 1 to 3, 5 and 7 to 8 over claims 1 to 5 of U.S. 6,927,033, the above comments concerning Kataoka '033 are applicable with regard to both of these double patenting rejections. In other words, the present claims are neither anticipated by nor obvious from the commonly assigned application and patent and further, the effects of the present invention are unobvious from these documents as discussed above.

If necessary, Applicants will file a Terminal Disclaimer, however, the filing of such is unnecessary in view of the above distinctions between the present claims and those of commonly assigned application and patent.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please

contact undersigned at the telephone number below.

Respectfully submitted,

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